Residual transport model in correlation with sedimentary dynamics over an elongate tidal sandbar in the Gironde Estuary (Southwestern France)

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Auteur	Mallet, Cyril [1], Howa, Hélène [2], Garlan, Thierry [3], Sottolichio, Aldo [4], Le Hir, Pierre [5]
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Résumé en anglais	This study qualitatively describes by a multidisciplinary approach hydrodynamic and residual sediment transport over a sandbar in a macrotidal environment. The sandbar is elongated and attached to a headland that is located in the Gironde estuary (southwestern France). Bathymetric surveys, side-scan-sonar sonograms, grain-size trends of surficial sediment, and 2DH numerical simulations of current patterns were used to define a conceptual model for the dynamics of this sandbar. The sandbar is oriented anticlockwise with respect to the main flow. The channel-oriented bar face is ebb-dominated, whereas the opposite face is flood-dominated, resulting in a clockwise residual transport. The line of sediment flux convergence corresponds to the crest of the bar. The residual flow over the bar appears to originate from the regional estuarine flow. The dominant process responsible for the maintenance of the sandbar seems to be the depth-averaged main tidal flow rather than secondary circulation due to headlands or the interaction between the tidal flow and the seabed. To generalize this regional conceptual model a qualitative comparison is made with the theories of sandbar dynamics due to tidal currents (Pingree and Maddock 1979, Zimmerman 1981, Huthnance 1982, and others). The seabed stability approach developed by Huthnance (1982) seems to be the most reliable theory to explain the Saint-Georges Bank dynamics, even though many natural factors are not taken into account.
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